

# Array Solutions StackMatch II

## User's Guide

Thank you for purchasing the StackMatch II. Since the StackMatch introduction it has become a standard for phasing mono-band and multi-band beams, logs, quads, etc. The unit comes with our Life Time Warranty. If it should fail for any reason, save for an act of nature, we will repair it or replace it for free. You only pay for shipping back to us.

### Controls

The StackMatch II control switch box has a rotary switch and three LEDs which display the antennas selected. The LEDs will light to indicate in the same pattern as chosen with the switch. Antenna 3 is your upper or U antenna, and antenna 1 is your lower or L antenna on the switch. When you rotate the pointer knob you can chose U, L, B, or AUX. The other positions will be off. But the StackMatch will default to full stack when no relays are energized. Pretty handy if you should have a 12V DC supply failure in a contest.

## ARRAY SOLUTIONS



StackMatch II Controller

## Control Selection

Selecting the positions is very simple:

U – Upper antenna only – top (3) LED will light

L – Lower antenna only – bottom (1) LED will light

B – Both – both antennas are fed in phase and matched – LEDs 3 and 1 will light

AUX – Auxiliary position – Middle LED (2) will light and the auxiliary option you chose will operate. Both antennas are selected and powered.

## Options

**Both OUT of Phase or BOP Option** – we have introduced the first ever wideband 180 degree out of phase option. It will place one of the beams 180 degrees out of phase with the other creating some very high propagation take-off angles. It works perfectly with logs, tribanders, quads, etc since it is very wide banded. 1.8 - 60 MHz.

**Dual Feedline Option** – with this option you may place one of the antennas on a second feedline to run to a second radio.

## Wiring the StackMatch

The StackMatch II control cable should contain at least 4 wires, 5 if AUX is used, or 3 or 4 wires and a shield. 18 - 20 gauge wires will work for even very long runs since the relay currents are only 40 mA. You will also need a 2 wire 12 V DC cable that you will wire to the terminal strip inside the box. You may use supplies up to 15 V DC.

The control box cover should be removed. A grommet is provided in the back to push the control cable through. The circuit board is wrapped inside the box with a control knob and a couple of wire ties.

Strip the insulation of the 4 or 5 wires and simply just tin them. You will find a terminal strip on the board with 7 terminals marked 1, 2, 3, IN, 12 V (+) and GND (Ground). Make a chart of your wire colors so you can do the same with the StackMatch box which will be mounted on the tower or at the hub of your antenna system. Use the Ty-Wrap™ supplied to secure the cable from pulling out of the box. Wire the + and GND terminals to the power supply, and wire your control cable to the 1, 3, IN and one wire or the shield to the GND terminals of the circuit board. Terminal 2 is unused. If you use the AUX function you will also add one wire the AUX terminal.

Wire the other side of the cable to the 1, 3, and IN as well as the GND terminals of the relay box. The number 2 terminal is not used. If you use the AUX function you will not find one in the relay box. You just bring the wire out to the Optional function device to give it the power it will need. Splice it to the devices red wire or + terminal. Ground the black wire or GND terminal to the StackMatch II GND terminal.

Replace the circuit board and assemble the box with the hardware provided. Also attach the knob to the shaft of the rotary switch using a small screwdriver to tighten the knob to the shaft.

Terminate this cable with a plug such as a Cinch Jones Plug a foot or so after it leaves the box to make it easy to disconnect the box from the cable. We also recommend you use a lightning surge device like the AS-303U or AS-303N cable protector we sell.

Use the TY-WRAP™ supplied to secure the wires from pulling out of the boxes. Replace the covers and screws.

## Weatherproofing

There are many viable techniques to weatherproof your connectors, please use your favorite one to keep your outside connectors protected. Do not seal the bottom tray in the Lid since the ability of having the box breathe will keep it dry from condensation which normally builds up in outdoor boxes. The board is coated and suspended above the box, and all hardware is stainless steel. All relays are sealed. This unit should give you a very long service.

## Installation

Most installations are used to phase a vertical stack of two antennas. To accomplish this prepare two equal lengths of 50 ohm coaxial cables which will reach both antennas in the stack from a central position. Mount the StackMatch using the supplied galvanized U-bolt to the tower at that central position. This is usually between the antennas although some prefer to mount the StackMatch at the base of the tower.

There is no need to use  $\frac{1}{4}$  wavelength cables or odd multiples of  $\frac{1}{4}$  wavelength cables, but you may do so if you wish. Just make the cables equal in electrical length.

Attach the cables to each antenna, and dress them along the tower to the StackMatch box. Attach the upper antenna to the number 3 port, and the lower antenna to the number 1 port. Bring a feed line from the shack to the remaining feed line port. Make sure you weatherproof your connections at the antennas and at the StackMatch. We also recommend a surge arrestor in the coaxial line like the AS-303U or the AS-303N we sell.

This completes the installation.

## Operation

The SWR of the antennas should be the same as they were as individual antennas. You can check them to make sure they are by selecting the individual antennas and running an SWR curve. You should tune your antennas so they have as identical SWR curves as possible. Now chose the B (Both) combination of antennas and verify the curves are about the same. Typically they will move up or down only 10 kHz. If you had a 1:1 SWR with the individual antennas you should also see a 1:1 SWR with the combinations of beams. The antennas should ideally be optimized to have identical SWR curves. Most users observe that the SWR curve flattens out when used in a stack.

Determining how much power gain you achieve can be modeled with the antenna programs available. You should be able to verify the stack is working by listening to DX signals and selecting various stack combinations. Remember different propagation will favor different arrival angles, and you may find the lower beam works best in some conditions vs. the stack. This is the beauty of being able to choose the takeoff angles of your signals to match the conditions during the day. Work with it several days to get a feel for what stacks can do for you.

The StackMatch can be used to select and power split to antennas which are not identical. This could be useful when you wish to beam in two different directions with antennas on the same tower or another tower or tree or whatever. Also you may wish to experiment with a vertical and a Yagi to take advantage of diversity reception and transmission. You can also feed dipoles, quads, vertical dipoles pulled away from the tower, etc. to achieve some interesting patterns.

## BIP-BOP Operation

Both-IN-Phase and Both-Out of-Phase, operation is possible for two multiband or mono band antennas. The reason for BOP operation is that two beams fed 180° out of phase will result in a very high angle take off lobe. This is useful for making a high stack of antennas which would have a very low take off angle main lobe work for local contacts or for E-Skip conditions where a high angle is desired. Our 180 degree wideband phase shifter option is available for this purpose.

## POWER HANDLING, MAINTENANCE, HOT-SWITCHING, ETC.

Under normal conditions the StackMatch would not be hot switched. But as contesters know, it is inevitable that at some time either a wrong antenna will be selected or a hot switch will be made in the heat of the battle. The StackMatch has been designed with this in mind. **You will not harm the unit with an occasional mistake.**

Actually, to keep the contacts from silver oxide build-up, the manufacturer of the relays recommends that these units be hot-switched occasionally. So once a month or so, apply 100 watts of power to the unit and run through the positions to keep them clean.

Your StackMatch II is rated for 3 kW CW – SWR under 2:1

Higher power models are available.

We have an applications note section on our website if you should need to troubleshoot your StackMatch.

More information on the options and advantages of using antenna stacks in our website, here:

<http://arraysolutions.com/stackmatch-general-information>

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We hope you enjoy your Array Solutions' StackMatch II. If you have any question whatsoever, please call or email us. We are glad to assist you in any way we can.



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